mixtures thereof, modifying pore openings and/or modifying a surface chemistry on the first side of the porous metallic substrate;

providing a liquid fluid immobilized within pores of the modified metallic substrate and allowing carbon dioxide molecules to (i) selectively absorb in the liquid fluid relative to other types of molecules, (ii) be mobile in the liquid fluid, and (iii) desorb from the liquid fluid into a gas phase on the second side of the membrane.

20. The method of claim **19**, wherein the chemical potential gradient of CO_2 is a partial pressure differential of CO_2.

21. The method of claim **19**, wherein CO_2 is separated from a feed gas mixture when the membrane is subjected to a gas pressure of 1 bar or greater on the first side of the membrane and a gas pressure less than 1 bar on the second side of the membrane by the feed gas mixture.

22. The method of claim **19**, wherein industrial-scale CO_2 gas separation is performed using a plurality of the membranes.

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